MMS ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

Region: Alaska

Planning Area: Beaufort Sea

Title: Beaufort Sea Nearshore Currents (AK-03-01)

MMS Information Need(s) to be Addressed: This study will be useful to MMS to validate the oil spill risk analysis model. It will provide understanding for oil spill contingency planning in areas outside the barrier islands versus inside the barrier islands. This information will be used to evaluate oil spill contingency plans for Liberty, if approved, and other developments. It would also be used for NEPA analysis and documentation for Beaufort Sea Lease Sales and DPPs.

Total Cost: $605,000 **Period of Performance:** FY 2003-2009

Conducting Organization: UAF, Institute of Marine Science

MMS Contact: Chief, Alaska Environmental Studies Section

Description:

Background Understanding the under-ice and open water currents through a long term time series is a necessary precursor to estimating potential effects on sensitive resources from oil spills or in the landfast ice. A recent MMS study provided measurements from three locations within the barrier islands of Stefanson Sound near Northstar and Liberty for 1999-2000, 2000-2001, and 2001-2002; and from a fourth location just outside the barrier islands in 2001-2002. The ongoing study has provided the first current, temperature, and salinity data covering the entire freeze up, winter, and breakup periods in the nearshore Beaufort Sea. Preliminary evidence suggests that in the future, a single mooring would suffice in capturing the along-lagoon flow in this region of Stefanson Sound.

Other areas of the Beaufort Sea have different current regimes and have not been sampled for under-ice currents and only limited open water currents. Lagoons in the eastern Alaskan Beaufort Sea have narrower passes between the barrier islands, causing a pulsed circulation in and out of the lagoons. These passes are important due to their potential to funnel flow and oil spills into the lagoons. Camden Bay, also to the east, is not protected by barrier islands and represents a third type of coastal flow regime. The only current meter moorings for these eastern Beaufort Sea coastal regimes were a small oceanographic program in summer 1988 and 1989.

Objectives

1. Measure currents, temperature, and salinity hourly at three locations in the landfast ice zone; one in the vicinity of Liberty and Northstar and two in new locations with different flow characteristics.
2. Quantify the magnitude of current variability and to describe the relationship between currents and local winds.

3. Estimate the vertical structure of the currents throughout the water column and how the structure changes with the development of the landfast ice through the winter and in summer when the ice melts and rivers flood the inner shelf.
4. Provide physical oceanographic data to the continuation of the Arctic Nearshore Impact Monitoring in Development Areas (ANIMIDA) study.

Methods

1. A 1200 kHz acoustic Doppler current profilers (ADCPs) will be moored for one-year periods, recovered, and redeployed for total of 3 years. All three moorings will have conductivity temperature depth measuring devices (CTD's) and transmissometers.
2. Local winds measured at Deadhorse, Northstar, Endicott, Oliktok and Badami and sea level data collected at the Waterflood facility will be collated for time-series comparison with mooring data.
3. Standard physical oceanographic time-series analyses (e.g., univariate statistical descriptors and correlation in both time and frequency domains) and velocity shear calculations will be done.

Current Status:

The contract is being modified to fund one additional field season to recover the two of four 2006-2007 moorings that could not be recovered in 2007 because of poor weather.

Final Report Due: June 2009

Publications Completed:

Danielson, S. 2007. Results from the Collection of Oceanographic Measurements from Three Nearshore Acoustic Doppler Current Meter Profilers (ADCPs) along the Inner Beaufort Sea Shelf from Smith Bay to Camden Bay [Abstract]. In: 2007 Alaska Marine Science Symposium held in Anchorage, AK January 21-24, 2007.

Dunton, K.H., T. Weingartner and E.C. Carmack. 2006. The nearshore western Beaufort Sea ecosystem: circulation and importance of terrestrial carbon in arctic coastal food webs. Progress in Oceanography 71:362-378.

Affiliated WWW Sites: http://www.mms.gov/alaska/

Revised Date: March 2008